bg end

the ellipsometric angles ψ and Δ.--

REMARKS

The application has been amended so as to place it in condition for allowance at the time of the next Official Action.

Previously, claims 1-18 and 20 were pending, claim 19 being cancelled in the Preliminary Amendment. This amendment cancels independent claims 1 and 15 as well as dependent claim 20. New claims 21-24 are added. Independent claim 21 is a method claim. Independent claim 22 is a system claim. New dependent claim 23 depends from independent claim 22. New independent claim 24 is a system claim.

The Official Action rejected the previously pending claims under §112, first paragraph, as containing subject matter not described in the specification in such a way as to enable one of skill in the art to make and/or use the invention.

In replacing the previously pending independent claims with the new claims, the claims have been drafted so as to comply with §112, first paragraph.

Specification page 1 discusses that real-time processes for ellipsometric control of layer development has, in the prior art, been implemented using simplified ellipsometry by determining the characteristic ellipsometric angles ψ and Δ of an object's surface (e.g., a substrate's surface). That is, in the prior art, the variation in the polarization vector of a reflected beam and an incident beam determines angles ψ and Δ and

thereby describe the object.

Applicant has recognized that the prior art techniques are insufficient to adequately characterize manufacturing processes, e.g., when the object's surface is anisotropic and couplings may occur among polarization modes.

The present inventive method and system recognizes that certain components (parameters) of the Jones or Mueller matrix (other than the ellipsometric angles ψ and Δ and the trigonometric functions of the ellipsometric angles ψ and Δ) can accurately represent an object and characterize the manufacture of the object, and that these components can be determined from ellipsometric measurements made during manufacture. Further, the present invention recognizes that only these selected matrix components need be extracted from the ellipsometric measurements made during manufacture.

Accordingly, during manufacture, the object is measured ellipsometrically, and then only these selected matrix components are extracted from the ellipsometric measurements to provide control parameters during the manufacture (the components not being the ellipsometric angles ψ and Δ or the trigonometric functions of the ellipsometric angles ψ and Δ).

The components can be determined by studying the manufacturing method while measuring the set of components comprising the matrix to extract specific components of the matrix coefficients that are suited to the characterization of

the desired manufacture result. Thereafter, only these specific components need be measured and monitored during production manufacture.

The components suited to characterize manufacture include a linear combination of the lines or columns of the matrix.

Accordingly, in view of the presently pending recitations and the above remarks, reconsideration and withdrawal of the §112, first paragraph rejection are respectfully requested.

Applicant acknowledges with appreciation that the Official Action indicated that the previously pending claims were allowable if the independent claims were rewritten to overcome the pending §112 rejection. Accordingly, allowance of all the pending claims is respectfully requested.

In view of the above, applicant believes that the present application is in condition for allowance and an early indication of the same is respectfully requested.

Attached hereto is a marked-up version showing the changes made to the claims. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Respectfully submitted,

YOUNG & THOMPSON

By _____
Roland E. Long, Jr.
Attorney for Applicant
Registration No. 41,949
745 South 23rd Street
Arlington, VA 22202
Telephone: 703/521-2297

June 3, 2003

"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

IN THE CLAIMS:

Claim 1 (canceled).

Claim 2 (original): A control method according to claim 1, characterised in that the said object is anisotropic.

Claim 3 has been amended as follows:

--3. (twice amended) A control method according to claim [1] 21, characterised in that the said object is depolarising.--

Claim 4 has been amended as follows:

--4. (twice amended) A control method according to claim [1] 21, characterised in that the said object induces diffraction phenomena.--

Claim 5 has been amended as follows:

--5. (twice amended) A method for controlling the manufacture of an object according to claim [1] 21, characterised in that the [parameters suited to the characterisation of the manufacture] selected components are a linear combination of the lines of the Mueller matrix.--

Claim 6 has been amended as follows:

--6. (twice amended) A method for controlling the manufacture of an object according to claim [1] 21, characterised in that the [parameters suited to the characterisation of the

manufacture] selected components are a linear combination of the columns of the Mueller matrix.—-

Claim 7 has been amended as follows:

--7. (twice amended) A method for controlling the manufacture of an object according to claim [1] 21, characterised in that the object manufactured is a solid-state component.—-

Claim 8 (original): A method for controlling the manufacture of an object according to claim 7, characterised in that the ellipsometric measurement characterises a layer during deposit.

Claim 9 (original): A method for controlling the manufacture of an object according to claim 7, characterised in that the ellipsometric measurement characterises a layer during engraving.

Claim 10 (previously amended): A method for controlling the manufacture of an object according to claim 8, characterised in that the ellipsometric measurement characterises the composition of the layer.

Claim 11 (previously amended): A method for controlling the manufacture of an object according to claim 8, characterised in that the ellipsometric measurement characterises the thickness of the layer.

Claim 12 has been amended as follows:

--12. (twice amended) A control method according to claim [1] 21, characterised in that the manufacture is carried out by gas dissociation and it is controlled by a gas panel.--

Claim 13 (original): A method for controlling the manufacture of an object according to claim 2, characterised in that the gas panel supplies a plasma reactor.

Claim 14 (previously amended): A method for controlling the manufacture of an object according to claim 2, characterised in that the gas panel controls gas flow-rates.

Claim 15 (canceled).

Claim 16 has been amended as follows:

--16. (amended) An installation for manufacturing an object according to claim [15] 22, characterised in that it is conducted by gas dissociation.--

Claim 17 has been amended as follows:

--17. (twice amended) An installation for manufacturing an object to claim [15] 22, characterised in that it comprises a coupled modulator at input.--

Claim 18 has been amended as follows:

--18. (twice amended) An installation for manufacturing an object to claim [15] 22, characterised in that it comprises a polarimeter at output.--

Claim 19 (canceled).

Claim 20 (canceled).

Claim 21 (new): A method of controlling manufacture of anisotropic and depolarizing objects, comprising the sequential steps of:

determining at least two selected components of the Mueller matrix that represents the object and that characterizes the manufacture of the object, the selected components being other than ellipsometric angles ψ and Δ and the trigonometric functions of the ellipsometric angles ψ and Δ;

making an ellipsometric measurement of object during manufacture;

extracting, from the ellipsometric measurement, only the determined selected components of the Mueller matrix; and

controlling the manufacture of the object in relation to the extracted components of the Mueller matrix.

Claim 22 (new): An installation for making anisotropic and depolarizing objects, comprising:

an ellipsometer configured to make an ellipsometric measurement of an object during manufacture;

a processor configured to extract, from the ellipsometric measurement, only determined selected components of the Mueller matrix that represents the object and that characterizes the manufacture of the object,

the processor also configured to control the manufacture of the object in relation to the extracted components of the Mueller matrix, wherein,

the determined selected components are at least two selected components of the Mueller matrix that characterize the manufacture of the object, and

the determined selected components are other than ellipsometric angles ψ and Δ and trigonometric functions of the ellipsometric angles ψ and Δ.

Claim 23 (new): The installation of claim 22, further comprising:

a plasma chamber (1) with power control;

a support (3) within the chamber for supporting the object, the object being a substrate (2) serving as an original element of a solid-state wafer to be manufactured;

a pump (4) connected to the chamber to maintain a pressure within the chamber; and

a gas panel (6) connected to the chamber to supply the chamber with gas, the gas panel having plural gas inputs (62-65), each gas input connected to the chamber via a flow-meter (621, 631, 641, 651) and a valve (622, 632, 642, 652),

the ellipsometer (9) comprising a transmission head

(91) and a receiving assembly (92), the ellipsometer arranged to control the gas panel to control a preparation of layers on the substrate,

the transmission head comprising a polarization state generator,

the receiving assembly comprising a polarimeter,

the processor comprising a first processing unit and a second processing unit,

the first processing unit (93) connected to the transmission head to control the polarization state generator, and connected to the receiving assembly to receive an output signal from the polarimeter, and

the second processing unit connected to the first processing unit for receiving control signals from the first processing unit, and connected to the gas panel, the pump, and the power control of the chamber.

Claim 24 (new): A manufacturing installation, comprising:

a plasma chamber (1) with power control;

a support (3) within the chamber for supporting a substrate (2) serving as an original element of a solid-state wafer to be manufactured;

a pump (4) connected to the chamber to maintain a pressure within the chamber;

a gas panel (6) connected to the chamber to supply the chamber with gas, the gas panel having plural gas inputs (62-65),

each gas input connected to the chamber via a flow-meter (621, 631, 641, 651) and a valve (622, 632, 642, 652);

an ellipsometer (9) comprising a transmission head (91) and a receiving assembly (92), the ellipsometer arranged to control the gas panel to control a preparation of layers on the substrate based on ellipsometric measurement of the substrate,

the transmission head comprising a phase modulator,

the receiving assembly comprising a polarizer-analyzer;

a first processing unit (93) connected to the transmission head to control the phase modulator, and connected to the receiving assembly to receive an output signal from the polarizer-analyzer,

the first processing unit configured to extract, from the ellipsometric measurement, only determined selected components of the Jones matrix describing the substrate and to control the manufacture of the substrate in relation to the extracted components of the Jones matrix,

a second processing unit connected to the first processing unit for receiving control signals from the first processing unit, and connected to the gas panel, the pump, and the power control of the chamber, wherein,

the determined selected components are at least two selected components of the Jones matrix that characterize the manufacture of the object, the selected components being other

than ellipsometric angles ψ and Δ and trigonometric functions of the ellipsometric angles ψ and Δ.--